



## UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
[www.uspto.gov](http://www.uspto.gov)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/555,090	11/02/2005	Yutaka Kitamura	Q90831	9358
23373	7590	06/07/2007	EXAMINER	
SUGHRUE MION, PLLC			DESAI, NAISHADH N	
2100 PENNSYLVANIA AVENUE, N.W.			ART UNIT	PAPER NUMBER
SUITE 800			2809	
WASHINGTON, DC 20037			MAIL DATE	DELIVERY MODE
			06/07/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	Application No.	Applicant(s)
	10/555,090	KITAMURA ET AL.
	Examiner Naishadh N. Desai	Art Unit 2809

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) Responsive to communication(s) filed on 02 November 2005.
- 2a) This action is FINAL.                    2b) This action is non-final.
- 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) Claim(s) 1-17 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) Claim(s) \_\_\_\_\_ is/are allowed.
- 6) Claim(s) 1-17 is/are rejected.
- 7) Claim(s) \_\_\_\_\_ is/are objected to.
- 8) Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) The specification is objected to by the Examiner.
- 10) The drawing(s) filed on 11/02/2005 is/are: a) accepted or b) objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
  - a) All    b) Some \* c) None of:
    1. Certified copies of the priority documents have been received.
    2. Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
    3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)	4) <input type="checkbox"/> Interview Summary (PTO-413)
2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)	Paper No(s)/Mail Date: _____
3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date <u>11/02/2005</u>	5) <input type="checkbox"/> Notice of Informal Patent Application
	6) <input type="checkbox"/> Other: _____

## DETAILED ACTION

### ***Priority***

1. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

### ***Information Disclosure Statement***

2. Reference JP 11-180162 has been considered by the examiner. The remaining listing of references in the Search Report is not considered to be an information disclosure statement (IDS) complying with 37 CFR 1.98. 37 CFR 1.98(a)(2) requires a legible copy of: (1) each foreign patent; (2) each publication or that portion which caused it to be listed; (3) for each cited pending U.S. application, the application specification including claims, and any drawing of the application, or that portion of the application which caused it to be listed including any claims directed to that portion, unless the cited pending U.S. application is stored in the Image File Wrapper (IFW) system; and (4) all other information, or that portion which caused it to be listed. In addition, each IDS must include a list of all patents, publications, applications, or other information submitted for consideration by the Office (see 37 CFR 1.98(a)(1) and (b)), and MPEP § 609.04(a), subsection I. states, "the list ... must be submitted on a separate paper." Therefore, the references cited in the Search Report have not been

considered. Applicant is advised that the date of submission of any item of information or any missing element(s) will be the date of submission for purposes of determining compliance with the requirements based on the time of filing the IDS, including all "statement" requirements of 37 CFR 1.97(e). See MPEP § 609.05(a).

***Claim Rejections - 35 USC § 102***

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. Claims 1-6,9 and 14 are rejected under 35 U.S.C. 102(b) as being anticipated by Ihata (US 6198188).

5. As per independent claim 1:

(original): A vehicular rotating electrical machine apparatus comprising(Fig 1 below of Ihata shows a rotating electrical machine):

a rotating electrical machine including a shaft (Fig 1,33) rotatably supported by a pair of brackets(Fig 1,4 and 5) having a suction hole at an end face(Fig 1,52) and an exhaust hole at an outer periphery(Fig 1,51), a rotor disposed in the pair of brackets, fixed to the shaft(Fig 1,3 is a rotor fixed to the shaft), having a field winding mounted to an

inside(Fig 1,23), and having cooling fans mounted to both end faces(Fig 1,35 and 36), and an armature(Fig 1,23) fixed to the pair of brackets(Fig 1,4 and 5) at an outer periphery of the rotor(Fig 1,3) to surround the rotor and including an armature iron core(Fig 1,32) on which an armature winding is wound(Abstract lines 3-6), and

an inverter unit which converts DC power of a battery into AC power, supplies the AC power to the armature winding and causes the rotor to generate rotating power, or converts AC power generated in the armature winding into DC power and charges the battery(Col 3 lines 8-9),

in which the inverter unit has a substantially hollow cylindrical shape or hollow polygonal prism shape(Fig 3B shows a polygonal shape with an air gap between), and includes a heat sink having many heat radiating fins at least part of an outer surface(Fig 3B,62-64), and

the inverter unit surrounds the shaft at an anti-load side end of the rotating electrical machine(Fig 1 shows the rectifier unit(element 6) to surround the shaft at an rear side), and is disposed to cause cooling air by the cooling fan to cool the heat radiating fins before cooling of the rotating electrical machine(Fig 1 shows the cooling fans to cool the fins before they cool the rotating electrical machine).

6. As per dependent claim 2:

(original): A vehicular rotating electrical machine apparatus according to claim 1, characterized in that the inverter unit includes the heat sink having the many heat radiating fins(Col 3 lines 51-56) made of metal material(Fig 3B elements 62 and 63 shows cooling fins denoted by a metal symbol in the drawing) at least one place of an inner peripheral surface(Col 3 line 61), an anti-bracket side end face, and an outer peripheral surface(Col 3 lines 60-63), is integrally fixed to an outside end face of one of the pair of brackets(Col 3 lines 57-58), and is covered by a cover provided with a suction hole at an end face in an axial direction(Col 3 lines 59-62), and

the inverter unit is disposed to cause the cooling air sucked by the cooling fan through the suction hole of the end face of the cover in the axial direction to cool the heat radiating fins before cooling of the rotating electrical machine. (Col 3 lines 51-67).

7. As per dependent claim 3:

original): A vehicular rotating electrical machine apparatus according to claim 1, characterized in that the inverter unit includes the heat sink having the many heat radiating fins(Col 3 lines 51-56) made of metal material(Fig 3B elements 62 and 63 shows cooling fins denoted by a metal symbol in the drawing) at least one place of a bracket side end face and an outer peripheral surface(Col 3 lines 60-63), is integrally fixed to an outside end face of one of the pair of brackets(Col 3 line 57-58), and is

Art Unit: 2809

covered by a cover provided with many suction holes at an outer peripheral surface(Col 3 lines 59-62), and

the inverter unit is disposed to cause the cooling air sucked by the cooling fan through the suction holes of the outer peripheral surface of the cover to cool the heat radiating fins before cooling of the rotating electrical machine(Col 3 lines 51-67).

8. As per dependent claim 4:

The heat radiating fins of Fig 1 of Ihata are radially disposed towards a center direction.

9. As per dependent claim 5:

The heat radiating fins of Fig 1 of Ihata are disposed in parallel to the shaft and expand radially from a center direction.

10. As per dependent claim 6:

Figure 1 of Ihata shows the rectifier unit fixed to the frame of the device and clearly shows the air intakes (element 52) to be separate from the air discharge holes (element 51) to prevent the hot air from being re-circulated into the air intakes holes.

11. As per dependent claim 9:

(original): A vehicular rotating electrical machine apparatus according to claim 8, characterized in that the partition plate(Fig 1,9) is integrally fixed to the inverter unit(Col

3 lines 57-67 of Ihata teaches the use of a rear and a cylindrical wall which are integrally fixed to the rectifier unit).

12. As per dependent claim 14:

Fig 3B of Ihata shows the rectifier unit(element 6) including heat sink elements 62 and 63 are arranged to be divided in an axial direction.

#### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

13. Claims 7 and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ihata as applied to claim 2 above.

14. As per dependent claim 7:

Fig 3B of Ihata, elements 62 and 63 shows cooling fins denoted by a metal symbol in the drawing. Ihata does not directly teach the use metal as a raw material for the cover to conduct heat away from the device. It is readily known in the art to a person having ordinary skills in the art to use a cover made of some form of metal since metal is known to have excellent heat dissipating properties. Therefore it would have been obvious to use a cover made of metal to conduct heat away from the heat radiating fins and the rotating electric machine.

15. As per dependent claim 8:

(original): A vehicular rotating electrical machine apparatus according to claim 1, characterized in that the inverter unit includes the heat sink having the many heat radiating fins(Col 3 lines 51-56) made of metal material at least one place of an inner peripheral surface(Col 3 lines 60-63), a bracket side end face(Fig 1, 4 and 5), and

an outer peripheral surface(Col 3 lines 60-63), and is integrally fixed to an inside end face of one of the pair of brackets(Fig 1, 4 and 5), and

the rotor and the armature are partitioned by a substantially donut-shaped partition plate with a through hole at a center(Col 3 lines 59-63), and the inverter unit is disposed(Fig 1,6) to cause the cooling air sucked through the suction hole of the end face of the

Art Unit: 2809

bracket in an axial direction by the cooling fan to cool the heat radiating fins before cooling of the rotating electrical machine(Col 3 lines 1-5)

Ihata does not directly teach the use metal as a raw material for the cover to conduct heat away from the device. Fig 3B of Ihata, elements 62 and 63 shows cooling fins denoted by a metal symbol in the drawing. It is readily known in the art to a person having ordinary skills in the art to use a cover made of some form of metal since metal is known to have excellent heat dissipating properties. Therefore it would have been obvious to modify the device of Ihata by using a cover made of metal to conduct heat away from the heat radiating fins and the rotating electric machine.

16. Claims 10-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ihata as applied to claim 1 above, in view of Kinoshita et al (US 5517401).

17. As per dependent claims 10-13

Ihata teaches the vehicular rotating electrical machine as discussed above. Ihata does not teach the switching elements to be controlled and for the capacitor to be connected in parallel with the inverter module. Kinoshita et al clearly speaks of an controlled inverter unit having power switching devices(see abstract). Kinoshita et al also teaches the capacitors to be connected in parallel with the inverter circuit, diodes(218 and 219) which control the field current and the use of a controller(Col 7 lines 19-21 and 34-44).

It would have been obvious at the time the invention was made to a person having ordinary skills in the art to modify the device of Ihata with Kinoshita et al to use a control device which controls the inverter switching elements with the capacitor connected in parallel and to use a diode as a field current controller. The motivation to do so is that it would provide an integral type power train for an electric vehicle, which is light, inexpensive and has low noise.

18. Claims 15 and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ihata in view of Kinoshita et al (US 5517401) as applied to claim 10 above and further in view of Sato (US 5731689).

19. As per dependent claims 15 and 16:

Ihata and Kinoshita et al teaches a rectifier for a vehicle ac generator. The device of Ihata of Kinoshita et al does not teach the switching elements to include SiC-SITs made of SiC(silicon carbide) material. Sato teaches the use of MOSFET using SiC (Col 15 lines11-14 and 50-51) in a SiC-SIT structure. It would have been obvious at the time the invention was made to one having ordinary skills in the art to modify the device of Ihata and Kinoshita et al with Sato to use a MOSFET switching element made of SiC in a SIT structure. The motivation to do so is that is would reduce power consumption, heat and also reduce electromagnetic radiation noise.

20. Claim 17 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ihata as applied to claims 1-5 above, in view of Kusase et al (US 5793144).

21. As per dependent claim 17:

(currently amended): A vehicular rotating electrical machine apparatus according to any one of claims 1 to 5 16, characterized in that the rotor includes

a rotor iron core including a magnetic pole part formed into a claw-pole type in which adjacent magnetic poles are different from each other and a cylindrical part having the field winding(Fig 2 of Kusase et al shows a claw pole type rotor core with adjacent magnetic poles to be different from each other and the winding is contained within the cylindrical part), and

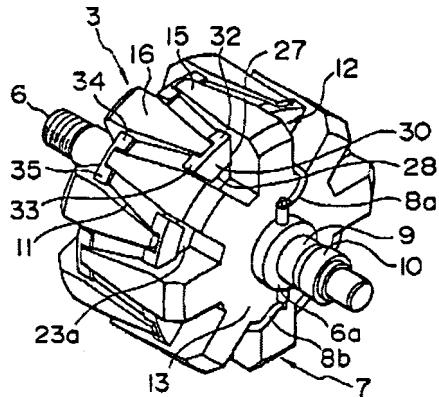
a permanent magnet which is provided in a magnetic circuit of the rotor iron core and supplies, together with the field winding, a magnetic flux to the armature iron core(Col 1 lines 27-33).

Kusase et al discloses the claimed invention except for the use of iron as a material for the core. It would have been obvious to one having ordinary skill in the art at the time the invention was made to make a core containing iron, since it has been held to be within the general skill of a worker in the art to select a known material on the basis of

its suitability for the intended use as a matter of obvious design choice. *In re Leshin*, 125 USPQ 416.

Ihata teaches the vehicular rotating electrical machine as discussed above. Ihata does not teach a claw pole type rotor. Kusase et al teaches a rotor with adjacent claw like magnetic poles. It would have been obvious at the time the invention was made to one having ordinary skills in the art to modify the device of Ihata to include the teachings of Kusase et al to make a rotor with claw like magnetic poles. The motivation to do so is that it would allow achievement of low noise and prevent generation of high frequency impact magnetic noise.

**FIG. 2**



### ***Conclusion***

22. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Nims teaches power transmission. Merrill et al teaches air

Art Unit: 2809

cooling for diode-rectified alternating current generators. Kwun et al teaches inverter integral type motor. Schneider et al teaches integrated AC machine. Adachi et al teaches vehicle-mounted alternator. Umeda et al teaches alternator. Welke teaches hybrid drive. Lawrie et al teaches automated manual transmission clutch controller. Asao teaches automotive alternator having a rectifier heat sink and voltage regulator heat sink integrated in one single support structure. Kumagai teaches rectifier for alternator having rectifier element covered with rectifier terminal. Kaneko et al teaches A.C. motor-inverter integrated drive unit. Tsukamoto et al teaches integrated drive motor/differential/inverter unit with improved housing for a vehicle. LaFontaine et al teaches compact high power alternator.

23. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Naishadh N. Desai whose telephone number is (571) 270-3038. The examiner can normally be reached on M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick Assouad can be reached on (571) 272-2210. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

NND



N. DREW RICHARDS  
PRIMARY EXAMINER